



# Post-Enumeration Survey Overview

Presentation to the National Advisory Committee on Racial, Ethnic and Other Populations

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United States<sup>®</sup>  
**Census**  
**2020**

# Post-Enumeration Survey Outline

- 1. Introduction to Census Quality**
- 2. 2020 Post-Enumeration Survey Design**
- 3. Schedule and Reports**

## Introduction to Census Quality

# Post-Enumeration Survey

## Measuring Census Quality

- **Census process indicators**
- **Assessments and evaluations of census operations**
- **Demographic Analysis (DA) and other methods**
- **Post-Enumeration Survey (PES)**

# Post-Enumeration Survey

## Coverage Measurement in the Past

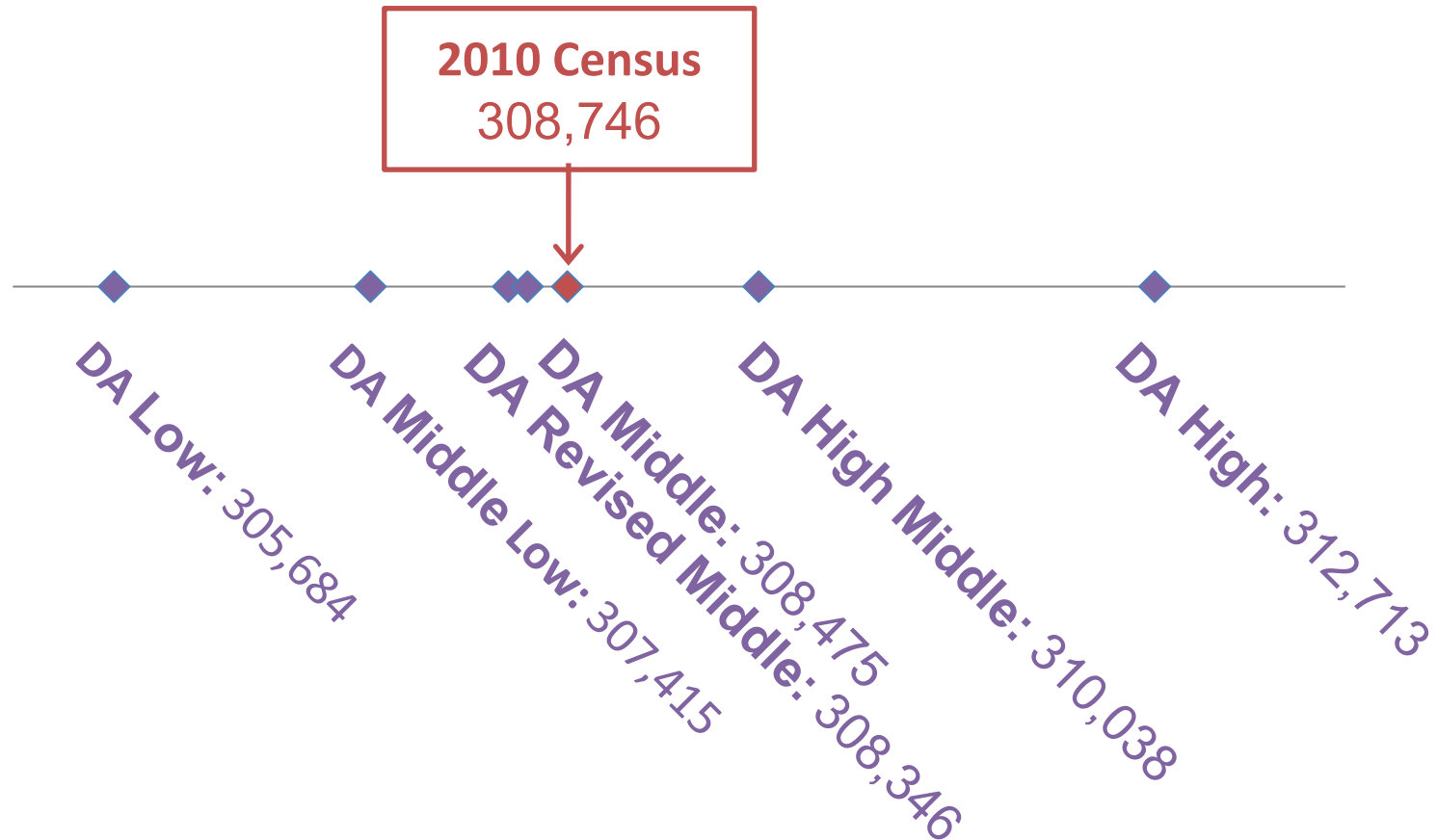
### **Demographic analysis for decades**

### **Coverage measurement surveys**

- **1980 Post-Enumeration Program**
- **1990 Post-Enumeration Survey**
- **2000 Accuracy and Coverage Evaluation**
- **2010 Census Coverage Measurement survey**

# Post-Enumeration Survey

## 2010 Census and Demographic Analysis (in Thousands)



# Post-Enumeration Survey

## Net Coverage Error

**Net census coverage error (defined as)**  
**= Census count – True population size**

- **Negative** coverage error means fewer people are included in the census than are in the true population (undercount)
- **Positive** coverage error means more people are included in the census than are in the true population (overcount)

***Note: In the past, that is, up through 2010, documentation of results from the Census Bureau's post-enumeration surveys has generally defined the net undercount using the opposite of the difference above. When providing results from 2020, and in these slides covering past results, we will use the definition above.***

# Post-Enumeration Survey

## Net Undercount of US Household Population

Year	Census Count	Net Coverage Error	Percent Coverage Error
2010	300,700,000	36,000	0.01 %
2000	273,600,000	1,332,000*	0.49 %*
1990	248,700,000	– 3,994,000*	– 1.61 %*

\* Statistically different from zero

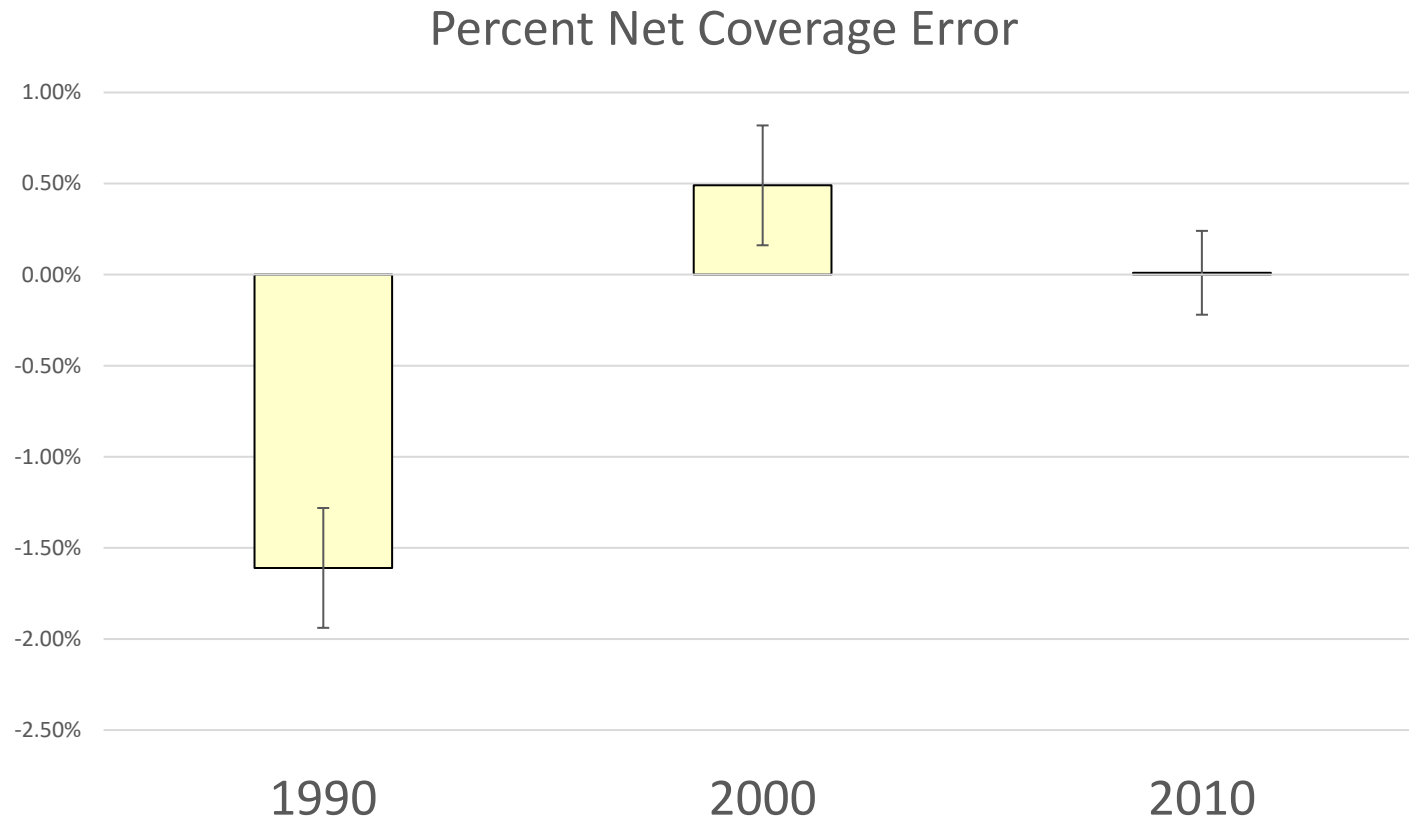
Census counts from 1990 to 2010 ,exclude Remote Alaska.

Census counts for 2000 and 2010 exclude Group Quarters population.

Census count for 1990 included people in housing units and in noninstitutional and nonmilitary Group Quarters.

# Post-Enumeration Survey

## U.S. Total Percent Net Coverage Error from 1990 - 2010



Error bars indicate 90% confidence interval.

# Post-Enumeration Survey

## Components of Census Coverage for the 2010 United States Household Population (in Thousands)

Component of Census Coverage	Estimate	Standard Error	Percent	Standard Error
Census Count	300,700	0	100.0	
Correct enumerations	284,700	199	94.7	0.1
Erroneous enumerations	10,040	199	3.3	0.1
Due to duplication	8,521	194	2.8	0.1
For other reasons	1,520	45	0.5	0.0
Whole-Person Census Imputations	5,993	0	2.0	0.0
Estimate of Population	300,700	429	100.0	
Correct enumerations	284,700	199	94.7	0.1
Omissions	16,000	440	5.3	0.1
Net Coverage Error	36	429	0.01	0.1

## 2020 Post-Enumeration Survey Design

# Post-Enumeration Survey

## What is the Post-Enumeration Survey?

### Goal

- Measure coverage of people and housing units in the decennial census
- Measure net coverage error and components of coverage
- No intent to adjust the census counts

### How are the data used?

- To assess the success of the current census
- To provide information to improve the coverage of future censuses

### How is coverage estimated?

- Conduct a survey in sample blocks
- Match people in the PES independent survey with enumerations in the census to determine who was missed or counted in error

### History

- Used in the United States census since 1950

# Post-Enumeration Survey

## 2020 Post-Enumeration Survey Universe

### **Household Population and Housing Units**

#### **Excludes**

- **Group Quarters and Group Quarters Population**
- **Remote Alaska**

# Post-Enumeration Survey

## Sample Sizes

### First sample (Basic Collection Units)

- Selected 9,800 Basic Collection Units in 50 states and District of Columbia
- Selected 400 Basic Collection Units in Puerto Rico

### PES listing

- 510,000 housing units in 50 states and District of Columbia
- 18,000 housing units in Puerto Rico

### After subsampling and review

- 161,000 housing units in 50 states and District of Columbia
- 7,100 housing units in Puerto Rico

# Post-Enumeration Survey

## Two enumerations in sample areas

### **Capture (Enumeration sample, E sample)**

- A sample of census records (enumerations) in the PES sample blocks, called E sample
- Measure correct enumerations in census
- Determine if enumeration is correct or erroneous; duplicate? correct location?

### **Recapture (PES sample, population sample, P sample)**

- A sample of blocks, independent of the census, in the post-enumeration survey (PES), called P Sample; interview people in units
- Match people in P Sample to Census

# Post-Enumeration Survey

## How PES Estimates are Created

		Enumerated in PES?	
		YES	NO
Enumerated in Census?	YES	Found in Both	Missing in PES Found in Census
	NO	Missing in Census Found in PES	Missing in Both

# Post-Enumeration Survey

## Current version of Dual System Estimator (DSE)

$$\widehat{TOT}_D = \sum_{j \in D} \left[ \pi_{dd,j} \pi_{ce,j} / \pi_{m,j} \right]$$

### Where

$j$  is a census enumeration, and

$D$  is the estimation domain (total, tenure status, age/sex groupings, etc.).

$\pi_{dd,j}$  is the predicted probability census case  $j$  is data-defined

$\pi_{cd,j}$  is the predicted probability that census case  $j$  is a correct enumeration

$\pi_{m,j}$  is the predicted probability that census case  $j$  was matched

## Schedule and Reports

# Post-Enumeration Survey

## Revised field milestone schedule

Operation	Original Dates		New Dates	
	Start	Finish	Start	Finish
Independent Listing	1/16/2020	3/20/2020	1/16/2020	3/20/2020
Initial HU Followup	5/6/2020	6/19/2020	7/30/2020	9/21/2020
Person Interview	6/17/2020	9/18/2020	9/23/2020	3/20/2021
Person Followup	2/3/2021	3/26/2021	6/14/2021	8/12/2021
Final HU Followup	5/19/2021	6/18/2021	10/25/2021	11/30/2021

Operations in **blue** are complete.  
Dates include reinterview.

# Post-Enumeration Survey

## Tentative Person Tabulations from PES

### Three major groups:

- **Demographic or housing unit characteristics**
  - Age Group
  - Age Group by Sex
  - Sex
  - Race and Hispanic Origin (alone or in-combination and mutually exclusive groups)
  - Relationship to Householder
  - Tenure (owner or renter)
- **Geographic areas**
  - Region
  - State
- **Census operations**
  - Coverage Improvement Universe
  - GSS Partnership County
  - In-Field Address Canvassing Outcome
  - Nonresponse Followup Respondent Type
  - Nonresponse Followup Workload
  - Response Mode
  - Response Rate Decile
  - Type of Enumeration Area

# Post-Enumeration Survey

## Release Coverage Reports and Tables

### **First Release**

- **National demographic estimates of net coverage of people**
- **National demographic estimates of components of coverage for people**
- **Tables can be downloaded on Census Bureau website**

### **Second Release**

- **State coverage estimates for people**
- **More detailed national coverage estimates for people**
- **All housing unit coverage estimates**
- **Coverage estimates for Puerto Rico**

# Post-Enumeration Survey

## Schedule to Release Methodology Reports

### **First Release**

- **Source and Accuracy Statement – National Person**

### **Second Release**

- **Estimation Design**
- **Estimation Methods: Characteristic Imputation**
- **Estimation Methods: Missing Data**
- **Estimation Methods: Net Coverage Estimation**
- **Estimation Methods: Component Estimation**
- **Source and Accuracy – All of PES**

# Post-Enumeration Survey

## References

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**How have you used census post-enumeration survey estimates in the past?**

**How do you think the Census Bureau should use the estimates of net coverage error and components of coverage in planning for the future?**

# Questions

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